St. Xavier's College

Midterm Examination, 2017

B.Sc. CSIT/ First Sem.

Physics

Full Marks: - 40

Pass marks: - 16

Time: 3hrs

Candidates are required to give their answers in their own words as far as practicable.

The figures in the margin indicate full marks

Group-A

1. 1. Show that in a spring mass system the KE and PE vary with time but the total energy remains constant. [7]
2. 2. What do you mean by intrinsic and extrinsic semiconductors? Show that Fermi level in an intrinsic semiconductor lies in the middle of the forbidden gap. [7]
3. 3. Derive an expression for Fermi energy level in intrinsic semiconductors. [6]

Group-B

4. What will be the potential at the centre of the square of side 23 cm, if the charges 1μC, -2 μC,-3 μC and 4 μC are placed at the corners? [4]

5. A large wheel of radius 0.4 m and moment of inertia 1.2 kg/m2, pivoted at the centre is free to rotate without friction. A rope is wound it and a 2kg weight is attached to the rope. When the weight has descended 1.5m from its starting position. a) What is its downward velocity? b) What is the rotational velocity of wheel? [4]

6. A charge particle of charge – 2x10-9C is placed paced mid-way between two particles of charges +2x10-9 C and +3x10-9C. What is the net foce on it and it and in what direction? [4]

7. Differentiate between different insulator, semiconductor and conductors. [4]

8. The energy gap of Ge is 0.75eV. Compare the intrinsic conductivity of Ge at 27^0C and 57^0C. [4]

Best of luck

ST. XAVIER'S COLLEGE

Maitighar, Kathmandu

Mid Term EXAMINATION

CSIT — 1st SEMESTER - 2017

Course Title: **Introduction to Information Technology**	Full Marks: 40
Course Code: CSC109 Time: 2Hrs	Pass Marks: 18

Candidates are required to answer the questions in their own words as far as practicable

Group A ***[2x10=20]***

1. What are the different input devices used in computer systems? Explain.
2. Explain Generations of Computers with example, features and Timeline also explain about the Classification of Computer;

Group B ***[4x5=20]***

3. Write down the function provided by Operating system?
4. What are the features of today's software? Explain briefly.
5. Write down the common uses of Internet in today's world.
6. Explain about the memory representation and hierarchy

St. Xavier's College

Maitighar, Kathmandu
Mid Term. Examination, 2017
B.Sc CSIT 1st semester

Subject: C Programming — FM : 40
Time : 2 hrs — PM : 18
All questions carry equal marks.

Attempt any EIGHT questions. (8 × 5 = 40)

1. Write flowchart and program to find area of a circle.
2. What is an identifier? Write down the rules of identifiers.
3. Define operator & operand. Write down about precedence & associativity of operators.
4. Write short notes on:
   a. Unary Operator   b. Symbolic constant   c. Library function
5. Write a program to detect an input character is vowel, consonant, digit, white space or other character.
6. Write a program to find sum of digits of an input integer number.
7. Write a program that displays a menu to select either circle, triangle, rectangle or square then allows to input respective parameter & displays area of respective shape.
8. Write a program to print

   1
   23
   345
   4567
   56789
   678901
   7890123

9. Write a program to check an input number is prime or composite.

St. Xavier's College

Bachelor of Science in Computer Science and Information Technology

Semester: First | **Course No:MTH-104**

Course Title: Mathematics I (Calculus and Analytical Geometry)

First term examination 2017

Sub: Mathematics | Full Marks: 40
Time: 2 hrs | Pass Marks: 16

Candidades are required to give their answer in their own words as far as practicable

Group – A [8 × 1.5 = 12]

1. Define the limit of a function f(x, y) at a point $(x_\circ, y_\circ)$.

   Evaluate: $\lim_{(x,y)\to(0,0)} \dfrac{x^2 - xy}{\sqrt{x} - \sqrt{y}}$.

2. Find the length of the curve $x = \dfrac{y^3}{3} + \dfrac{1}{4y}$ from y = 1 to y = 3.

3. Show that the value of $\int_0^1 \sin(x^2)dx$ can not possibly be 1.

4. Find the angle between the planes x + y + z = 1 and x – 2y + 3z = 1.

5. Find the area of the region between the curves $y = \sec^2 x$ *and* $y = \tan x$ *from* 0 *to* $\dfrac{\pi}{4}$.

6. Verify Rolle's theorem for the function f(x) = $\dfrac{x^3}{3} - 3x$ on [-3, 3].

7. Is the function $f(x) = \begin{cases} \sin x & x < 0 \\ x & x \geq 0 \end{cases}$ derivable at x = 0 ?

8. Test the series using integral test if p>1 : $\sum_{n=1}^{\infty} \dfrac{1}{n^p}$

Group – B [2 × 3 + 1 × 4 = 10]

6. State and prove the Mean Value Theorem for a differentiable function.

7. Evaluate: $\int_2^{\infty} \dfrac{x+3}{(x-1).(x^2+1)} dx$. **Or**

   Find the length of the asteroid: $x = \cos^3 t$, $y = \sin^3 t$ $\quad 0 \leq t \leq 2\pi$.

9. Find a formula for the distance D from a point $P_1(x_1, y_1, z_1)$ to the plane ax + by + cz + d = 0.

Group – C [3 × 6 = 18]

10. Define the unit tangent vector, normal vector, curvature and torsion of a space curve. Find the torsion, normal and curvature of helix curve $r(t) = (3\cos t)\vec{i} + (3\sin t)\vec{j} + (4t)\vec{k}$.

11. Find the area of the region between the curve of the function f given by $f(x) = x^3 - x^2 - 2x$ and x-axis on the interval $[-1, 2]$

12. State and prove the Mean Value Theorem for definite integral. Apply the theorem to

(i) Calculate the average value of $f(x) = x^2 - 1$ on $[0, \sqrt{3}]$.

(ii) Does f actually take on this value at some point in the given domain?

ST. XAVIER'S COLLEGE

MAITIGHAR, KATHMANDU
MID TERM EXAMINATION
B.SC. CSIT — FIRST SEMESTER - 2017

COURSE TITLE: DIGITAL LOGIC	FULL MARKS: 40
COURSE CODE: CSC-151	PASS MARKS: 16

Long Answer Questions. All questions are compulsory. **10 *2 = 20**

1. A combination of three lights is to be shown in a set sequence at a rock music concert. The three lights are red (R), green (G) and yellow (Y). The sequence is as follows.
   a. Red only for 3 second
   b. Red and Green for 1 second
   c. Yellow only for 3 seconds
   d. Green only for 1 second

   A counter is used which consists of three bits (A, B and C). The counter is incremented every second and recycles continually.
   A logic circuit is to be built to generate the sequence of lights. A Boolean value of 1 represents the lights switched on. The lighting sequences starts with red only.
   Draw a truth table for the sequence of lights with an equivalent circuit diagram.

2. A wind turbine must shut down when certain conditions are met. The three variables and the conditions which dictate their values are shown in the table:

variable		binary value	condition
name	description		
W	wind speed	1	wind speed ⩾ 100 kilometres per hour (kph)
		0	wind speed < 100 kilometres per hour (kph)
P	oil pressure	1	oil pressure **low**
		0	oil pressure **normal**
T	motor temperature	1	motor temperature ⩾ 50 °C
		0	motor temperature < 50 °C

A logic circuit is to be designed where the output, X, is 1 if:

EITHER wind speed >= 100 kph and oil pressure normal
OR motor temperature >= 50°C and oil pressure low
OR wind speed <100 kph and motor temperature >=50°C.

Draw a logic circuit along with required truth tables meeting the above conditions.

Short Answer Questions. (Attempt any 5 Questions.) **4*5=20**

3. a. Show using truth tables: $A \oplus B = \overline{A \cdot B + \bar{A} \cdot \bar{B}}$
   b. Draw circuits for the right-hand side of part a.

4. A logic circuit implements the following Boolean function.

$$F = A'C + AC'D'$$

It is found that the circuit input combination A=C=1 can never occur. Using K-maps and proper don't care conditions, find a simpler expression for F and implement it using NOR gates only.

5. Explain the digital computer system along with a block diagram.

6. Prove the associative and distributive law of Boolean Algebra with necessary diagrams.

7. Simplify into minimum number of literals using Boolean Algebra Theorems.
   a. $F = (ab'c' + ab'c + abc + abc')(a+b)$
   b. $F = xy + x'z + yz$

8. Find the complement of the following Boolean functions and verify using truth tables.
   a. $F = x(y'z' + yz)$
   b. $F = ab' + ac + b'c$

St. Xavier's College

Maitighar, Kathmandu

Send up Examination 2018

B.Sc. CSIT

Course Title: Physics (Phy113) Full Marks: 60

Semester: I Pass Marks: 24

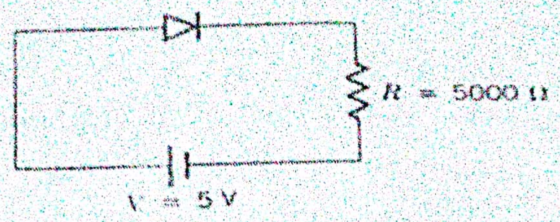
Duration: 3HRS Credit hours: 3

Attempt any two questions. (2X10=20)

1. What is semiconductor? Describes its types. Derive the relation for electron concentration in an intrinsic semiconductor. [10]
2. Set up differential equation for an oscillation of a spring using Hooke's and Newton's second law. Find the general solution of this equation and hence the expressions for period, velocity and acceleration of oscillation. [10]
3. What is de-Broglie hypothesis? Explain Davission-Germer experiment to show electron beam behave as like a wave. [10]

Attempt any eight questions. (5X8=40)

4. Explain Hall effect and discuss the importance of Hall voltage while manufacturing electronic devices. [5]
5. Write down the assumptions of classical free electron model. Discuss that how this model fails to explain the temperature dependence of conductivity. [5]
6. Define RS-flip-flop .Show that RS-flip-flop constructed by using NAND gate ? [5]
7. A body of mass 0.1Kg is undergoing a SHM of amplitude 0.1m and period 2Sec. 1) What is the maximum force on the body? 2) If the oscillations are produced in the spring, what should be the force constant? [5]
8. A copper strip 2cm wide and 1mm thick is placed in a magnetic field of 1.5T. If a current of 200A is set up in the strip. Calculate i) Hall voltage ii) Hall mobility if the number of electron per unit volume is $8.4\times10^{28}/m^3$ and resistivity is 1.72×10^{-8} Ohm-m. [5]
9. Find the energy of neutron in unit of electron in eV whose de-Broglie wave length is 1^0A. (Given mass of neutron is 1.67×10^{-27} Kg). [5]
10. A macroscopic object of mass 100gm is confined to move between two rigid walls separated by 1m. What is the minimum speed of the object? What should be the quantum number if the object is moving six times this speed? [5]
11. Gold is monovalent. The atomic weight and the density of gold are 197gmper mole and 19.3gm per cubic centimeter respectively. Calculate the number of free electrons per unit volume. [5]
12. The voltage across the resistor R is 4.6V in the diagram given below. What is the reverse saturation current of the diode if the temperature is 27^0C. [5]



Best of luck

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Maitighar, Kathmandu

Send-Up EXAMINATION

CSIT — 1st SEMESTER - 2018

Course Title: Introduction to Information Technology — Full Marks: 60

Course Code: CSC109 — Time: 3 Hrs — Pass Marks: 27

Candidates are required to answer the questions in their own words as far as practicable

Group A

Attempt any two questions. (2 × 10 = 20)

1. What is operating system? Discuss different functions of operating system in detail. (2 + 8)

2. Why do we need computer network? Discuss different types of network topologies along with their merits and demerits. (3 + 7)

3. Define DBMS and list its users. Discuss three levels of database system architecture in detail. (3 + 7)

Group B

Attempt any eight questions. (8 × 5 = 40)

4. Discuss characteristics of third generation of computers. What about fifth generation? (3 + 2)

5. Explain the components of CPU in brief. (5)

6. What is primary memory? Discuss different types of primary memory. (1 + 4)

7. Explain different types of printers with example. (2 + 3)

8. Convert (AF7)16 to binary. Subtract (1001101)2 from (1100011)2. (2 + 3)

9. Define IP address with example. What are the benefits of using domain name? (2 + 3)

10. What are the components of multimedia? Discuss. (5)

11. Define cryptography. What are the security services in detail? (1 + 4)

12. Write short notes on: (2 × 2.5 = 5)

    a. Big Data

    b. Intrusion Detection system

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SEND UP EXAMINATION

BSCCSIT — 1st SEMESTER - 2018

Course Title: C Programming
Course Code: : CSC-110 | Time: 3Hrs | Full Marks: 60
Pass Marks: 27

Section A

Long Answer Questions

Attempt any 2 questions. [2*10=20]

1. Define pointer and list its advantages. Describe the difference between passing arguments by value and passing arguments by address with suitable program. [4+6]
2. Define Structure and differentiate with Array? Make a program using structure of customer having data members customer id, name, quantity, rate and amount. Enter four data and calculate amount of each customer. [3+4+3]
3. Explain various modes in which file can be opened? Write a program to create a file named "line.txt" and store an input line of text into the file. Then read the file "line.txt" but display only consonants. [2+4+4]

Section B

Short Answer Questions

Attempt any 8 questions. [8*5=40]

4. What do you mean by algorithm and flowchart? Explain the Compilation and Execution of any C program? [1+1+3]
5. Define nested if else statement with suitable flowchart. Write a C code to check if user given input is exactly divisible by 5 or 11 using nested if else statement? [2+3]
6. List various binary and unary operators used in C? Write a program to find the HCF and LCM of two positive integer numbers. [1+4]
7. Write a program to open a file named "INVENTORY.DAT" and display following data as shown below: [1+4]

Item Name	Price	Quantity
A – 1	100	10
B – 1	150	20
C – 1	200	30
D – 1	250	40

8. Write syntax to declare and initialize 2-dimensional array? With suitable program logic that searches a number in a list of n integer numbers stored in 2-dimensional array. [1+4]
9. Explain the concept of recursive function using the example program to reverse an input string. [5]
10. Write a program to find product of two matrices dynamically. [5]
11. Explain about the graphics in C. Write a program to draw a triangle using line() graphics function. [1+4]
12. Write short notes on: [2+3]
    i) Dynamic Memory Allocation
    ii) switch ... case

ST. XAVIER'S COLLEGE

Maitighar, Kathmandu

Send-Up EXAMINATION

CSIT — 1st SEMESTER - 2018

Course Title: Mathematics | **Full Marks: 80**

Course Code: MTH-112 | **Time: 3 Hrs** | **Pass Marks: 32**

Group A (3 x 10 = 30)

Attempt any three questions.

1. (a) A function is defined by $f(x) = \begin{cases} 1-x, & if\ x \le -1 \\ x^2 & if\ x > -1 \end{cases}$ [5]

   Evaluate f(-3); f(-1) and f(0) and sketch the graph.

   (b) Prove that the limit $\lim_{x \to 0} \frac{|x|}{x}$ does not exist. [5]

2. (a) Sketch the curve : $\frac{2x^2}{x^2-1}$ [5]

   (b) Estimate the area between the curve $y = e^x$ and the lines x = 0 and x = 1, using rectangle method. [5]

3. (a) Show that the volume of a sphere of radius r is $\frac{4}{3}\pi r^3$. [4]

   (b) Define initial value problem. Solve: $x^2y''+xy'=1,\ x>0\ ,\ y'(1)=0\ and\ y(1)=0.$ [6]

4. (a) Find the torsion, normal and curvature of helix curve: $(2\cos t)\vec{i} + (2\sin t)\vec{j} + 3t\vec{k}$.[6

   (b) Find the shortest distance from the point (1; 0; -2) to the plane x + 2y + z = 4 . [4]

Group B (10 x 5 = 50)

5. Determine whether each of the following functions is even, odd, or neither even nor odd.

   (a) $y = x^5 + x$ (b) $y = 1 - x^4$ (c) $y = 2x - x^2$

6. Define continuity of a function at a point x = a. Show that the function $f(x) = 1 - \sqrt{1-x^2}$ is continuous on the interval [-1, 1].

7. Verify the Rolle's theorem for $f(x) = x^3 - x^2 - 6x + 2$ in [0, 3].

8. Find the third approximation x_3 to the root of the equation $f(x) = x^3 - 6x - 5$ setting $x_1 = 2$.

9. Evaluate: $\int_{-\infty}^{0} x\, e^x dx.$

10. Find the volume of the solid obtained by about y - axis the region between y = x and $y = x^2$.

11. Solve: $y''+y'-6y=0,\ x>0\ ,\ y'(0)=0\ and\ y(0)=1.$

12. Find the Maclaurin's series for sin x and prove that it represents sinx for all x.

13. Show that the series $\sum_{n=0}^{\infty} \frac{1}{1+n^2}$ converges.

14. Calculate: $\iint_R f(x,y)\,dA$ for r = $f(x,y)=x^2y-2xy,\quad R:-2\le x\le 0,\ 0\le y\le 3.$

15. Find the partial derivatives of $f(x,y) = x^3 + x^2y^3 - 2y^2$ at (2, 1).

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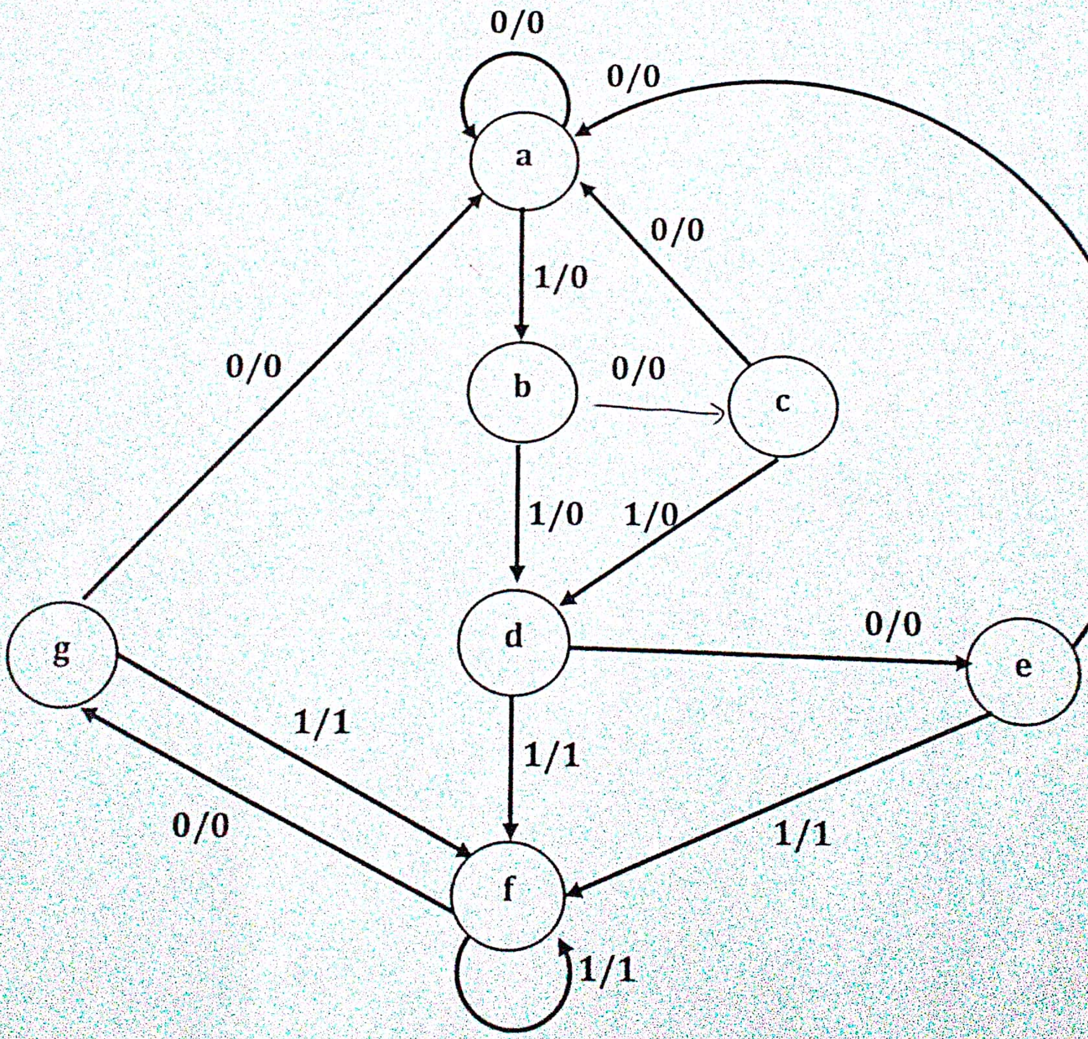
MAITIGHAR, KATHMANDU
SEND UP EXAMINATION
B.SC. CSIT — FIRST SEMESTER - 2018

Course Title: Digital Logic
Course Code: CSC-111

Full Marks: 60
Pass Marks: 24

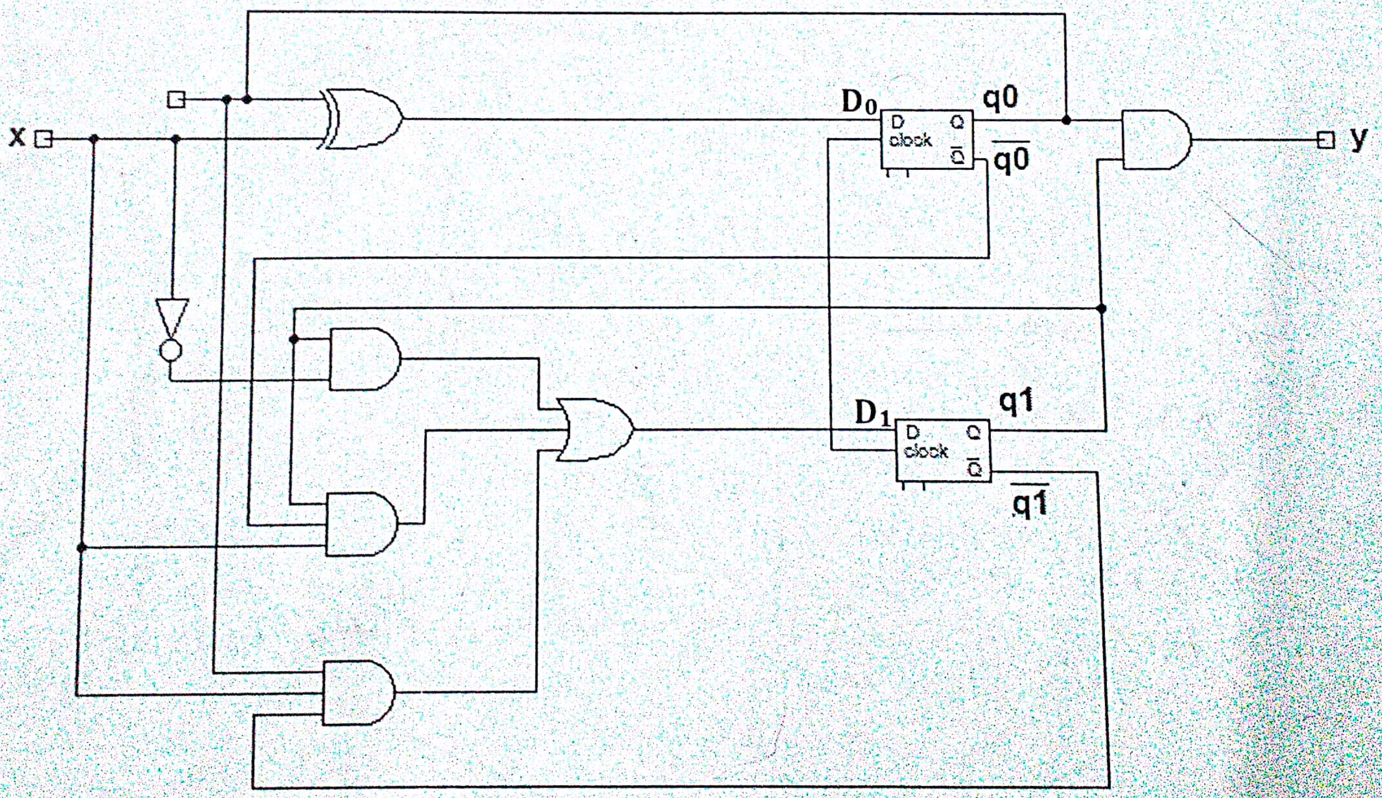
Long Answer Questions. (Attempt any 2) 10 *2 = 20

1. Write about the Master Slave FF using JK Flip flop with necessary explanations.
2. Define counter. Explain the operation of a synchronous decade counter with the help of its logic diagram. Also draw the timing diagram referring to the state sequence and state diagram.
3. Consider an input sequence **01010110100** starting from the initial state a. Introduce a state reduction strategy to minimize the number of states in the above state diagram. Also assign any arbitrary binary state values to represent the reduced state table.



Short Answer Questions. (Attempt any 8) 8*5=40

4. Design and explain a 4-bit magnitude comparator circuit
5. i. Convert $(FADE.456)_{16}$ to decimal number system.
   ii. If A = 33 and B = 34, represent them in Binary and perform A-B using 2's complement.
6. Mention the different types of shift registers and explain serial in serial out transfer of data when data = 1001.
7. Design a circuit which produces 2's complement of the given four-bit binary digit.
8. Design a Decimal Adder circuit and explain its working mechanism in brief.
9. Explain the operation of PLA using your own design of any PLA.
10. What is a decoder? Implement the following minterms using decoder.
    a. F(w,x,y,z)= Σ(0,1,3,4,8,9,10)
    b. F(w,x,y,z)= Σ(1,3,5,6,11,13,14)
11. Design a circuit that produces the square of three-bit number using ROM.
12. Analyze the following clocked sequential circuit deriving the equation of next states for D0, D1 and y.



13. Write short notes on (Any 2)
    a. TTL Logic
    b. ROM
    c. De Morgan's Theorem